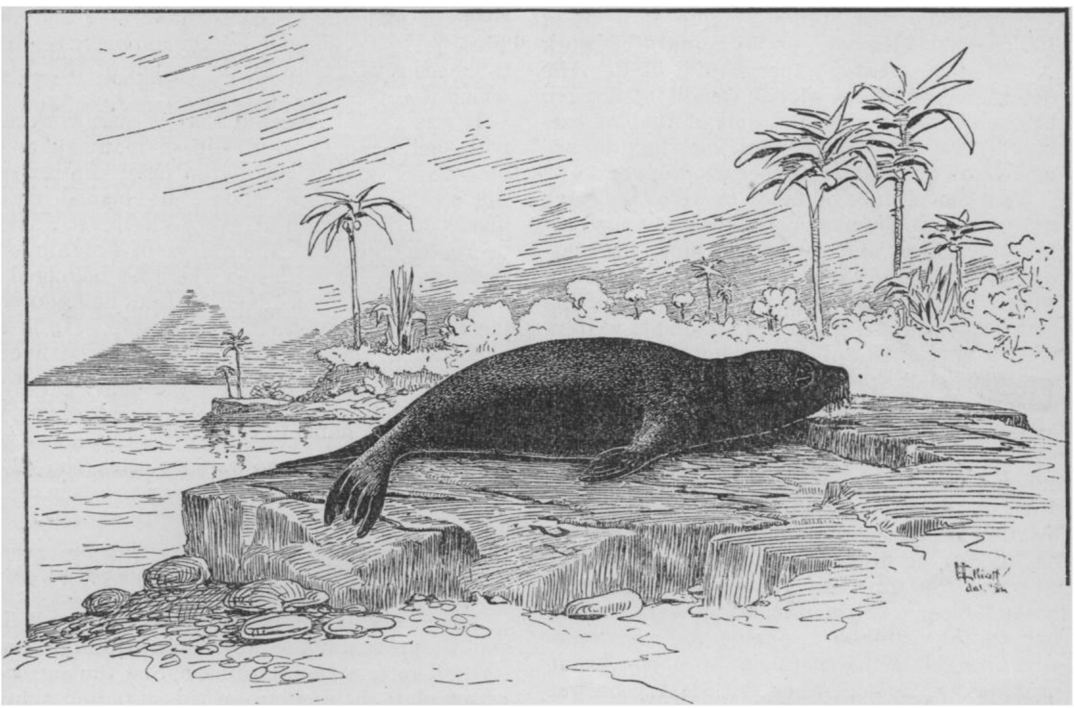
Poey of Havana, and by him presented to the Smithsonian institution.

The color of the body of this tropical seal is an intense ebony black, with the hair remarkably short and stiff. The length of this creature is about four feet, with a circumference of the body near the fore-arms of three feet. Although Dampier seems to have been impressed by the large numbers of these seals in 1675, yet, as long ago as 1843, it was excessively rare, — as much so as it is to-day. This fact declares the industry and zeal of the old 'oyle' hunters, who were busy in slaughtering the Monachus long after Dampier set the example.



In the *Jamaica almanack* for 1843, Mr. Richard Hill published a memoir on a seal inhabiting the Pedro Kays, a reef of rocks lying off the south coast of Jamaica. This has been transcribed by Allen, and it seems to apply directly to the animal which we figure. Allen sums its distribution up as follows: "It therefore appears that the habitat of the West-Indian seal extends from the northern coast of Yucatan, northward to the southern point of Florida, eastward to the Bahamas and Jamaica, and southward along the Central-American coast to about latitude 12°. Although known to have been once abundant at some of these localities, it appears to have now well-nigh reached extinction, and is doubtless to be found at only a few of the least frequented inlets in various portions of the area above indicated." Being still well known to many of the wreckers and turtle-hunters, it seems strange that it should have remained almost unknown to naturalists.

Perhaps this figure and notice may serve to stimulate the attention of some one of the many fruit and sponge vessel owners now cruising in West-Indian waters, who, detecting the presence of another specimen, may secure it, and forward the rare and valuable trophy to those who would appreciate and preserve it.

HENRY W. ELLIOTT.

Smithsonian institution, May 21.

THE TOEPLER-HOLTZ MACHINE.

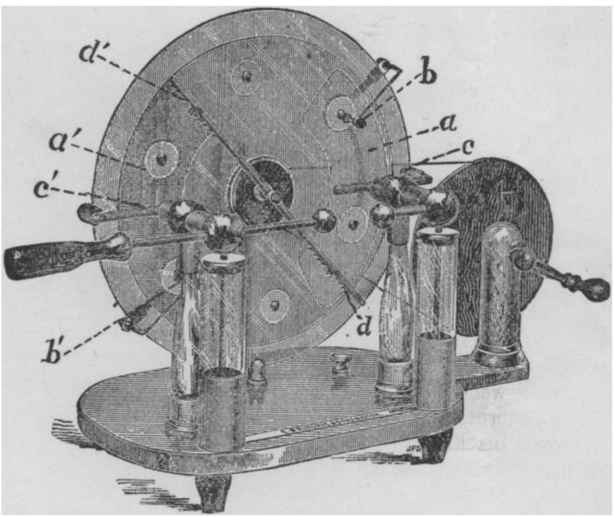
THE Toepler-Holtz induction electric machine is too well known to need description; but, as no explanation of its action is to be found in any book which has come under my observation, the following explanation may be of interest to teachers: —

Consider the machine before you, the revolving-plate in front.

Designate the right-hand paper sector by *a*, the brush connected with it by *b*, the comb connected with the discharging-rod by *c*, the comb in metallic connection with a similar comb diagonally opposite by *d*, and the corresponding parts on the left-hand side by *a′*, *b′*, *c′*, and *d′*.

If the left-hand sector *a′* be charged with negative electricity, it draws positive electricity from the comb *d′* upon the revolving-plate, which is supposed to move in the direction of the hands of a watch. When the positive electricity on the plate reaches the brush *b*, it draws negative electricity from the brush, and leaves the sector *a* charged with positive.

This positive electricity on the sector, and the positive that is left on the plate, both draw



negative from the comb *c*, and leave the discharging-rod connected with it charged with positive electricity.

The plate, now nearly neutral, passes under the diagonal comb *d*, and from it receives a charge of negative electricity, drawn out by the positive on the sector *a*, which at the same time repels positive electricity along the diagonal, and out of *d′* upon the revolving-plate.

The plate, now charged with negative electricity, passes under the brush *b′*, draws positive electricity from it, and thus increases the negative charge on the sector *a′*. The residue of negative electricity on the plate, and the negative on the sector, both draw positive from the comb *c′*, and leave the discharging-rod connected with it charged with negative electricity. The plate, now nearly neutral, passes to our starting-point *d′*, and the process is repeated.

If the machine is operated in the dark, the brush *b′*, and the points on *c′* and *d′*, will be tipped with the well-known positive brushes, while *b*, *c*, and *d* will show only the negative glowing points. The relative lengths of the brushes on *c′* and *d′* will depend on the position of the discharging-rods. If *a* is negative in the place of *a′*, the position of the brushes will, of course, be reversed. The nature of the electricity on any part of the machine may be tested by bringing the point of a lead-pencil near it, and noticing the form of the discharge from the point.

The great use of the knobs on the revolving-plate is to keep the paper sectors charged. Two knobs give better results than the usual six or eight; the reason apparently being, that the larger number of knobs keeps the sectors overcharged, and there is a continual loss (by brushes from the sectors) of electricity that would otherwise remain on the revolving-plate, and help to increase the charge on the discharging-rods.

Somewhat longer sparks are also obtained by connecting the sectors and discharging-rods on the same side, by conductors; but the machine, thus arranged, reverses more readily, does not give sparks so rapidly when the discharging-knobs are near together, and is started by separating the knobs.

In some forms of the machine used in Germany the fixed plate is in two parts, separated by a vertical air-space. This is an improvement, because it prevents the electricities of the two sectors from uniting across the surface of the plate. Machines of this sort sometimes have as many as sixty revolving-plates, all on one axis. Such machines give large quantities of electricity, but not very long sparks.

The following experiments, not generally known, illustrate the power of the single plate machine. If a strip of vulcanite about two inches wide is moved to and fro in front of the positive pole, the length of the spark will be greatly increased, sometimes reaching five inches and a half on a machine whose revolving-plate is only ten inches and a half in diameter. If a drop of stearine is placed on a thin sheet of glass, which is too large for the spark to pass around the edges, and the glass is held between the discharging-knobs of a good ten-and-a-half-inch machine, with the drop toward the positive knob, the spark will

pierce the glass when the knobs are about one inch apart. H. W. EATON.

GEOLOGY AND MINERALOGY OF NORTHERN CANADA.[1]

By northern Canada, the author meant the whole of the Dominion northward of the organized provinces and districts, as far as known. His information was derived from his own observations around Hudson's Bay and in the North-west territories, and from the reports and maps of the scientific men who had accompanied the various arctic expeditions by land and sea. Specimens and interesting notes on the geology of Great Slave Lake had been received from Capt. H. P. Dawson, R.A., who had spent last year there, in charge of the Canadian station of the circumpolar commission. The distribution of the various formations, from the oldest to the newest, was illustrated by a large, geologically colored map of the whole Dominion. Referring to the Laurentian system, Professor Bell showed that it forms the surface-rock over an enormous circular area on the main continent, and that the central part of it is occupied by Hudson's Bay, with a border of paleozoic rocks around it. Laurentian rocks are largely developed in Greenland, and along the Atlantic coast from Newfoundland to Georgia. Taken together, the general outline of the Laurentian areas of North America has a form corresponding with that of the whole continent, which has been built around these ancient rocks. The Huronian strata which constitute the principal metalliferous series in Canada were closely associated with the Laurentian, and appeared to be always conformable with them. The largest and best-known areas were between Lake Huron and James's Bay; but Dr. Bell had found four belts of them on the east coast of Hudson's Bay, and others had been recognized in the primitive region to the west of it. Indeed, wherever the older crystalline rocks had been explored in Canada, belts or basins having the character of the Huronian series had been met with. Limestones, slates, and quartzites, interstratified with amygdaloids, basalts, etc., corresponding with the Nipigon formation of Lakes Superior and Nipigon, were largely developed on the Eastmain coast and adjacent islands of Hudson's Bay, and apparently, also, on the Coppermine River, and to the westward of it. But a set of hard red siliceous conglomerates and sandstones were seen to come between the Huronian and the Nipigon series at Richmond Gulf on the Eastmain coast, which appeared to be unconformable to both. Mr. Cochrane and Dr. Bell had found similar rocks on Athabasca Lake; Capt. Dawson, on Great Slave Lake; and Sir John Richardson, to the north-east of Great Bear Lake. The conglomerates, slates, and gray argillaceous quartzites of Churchill, and the white fine-grained quartzite of Marble Island, were probably of this horizon. Silurian rocks were well known to be widely spread on some of the largest of the arctic islands, and along the most northern channels of the Polar Sea. They formed an irregular and interrupted border on the western sides of Hudson's and James's Bays. A large basin of Devonian strata containing gypsum and clay-ironstone extended south-westward from James's Bay. West of the great Laurentian area, Devonian rocks could be traced here and there, all the way from Minnesota to the mouth of the Mackenzie River. They were not, however, so widely distributed as had been supposed by the older travellers who had passed rapidly through the country in the early part of the century, when the whole subject of American geology was in its infancy. The so-called bituminous shales of Sir John Richardson and others, which are so prevalent along the Athabasca and Mackenzie Rivers, were found by Professor Bell to consist of soft cretaceous strata, which had been saturated and blackened by the petroleum rising out of the underlying Devonian rocks, which here, as in Ontario, Ohio, and Pennsylvania, are rich in this substance. The principal features and the geographical distribution of the carboniferous, liassic, cretaceous, and tertiary rocks of the northern regions were successively described. Among other points of interest in reference to the post-tertiary period, Dr. Bell mentioned that the remains of both the mastodon and the mammoth had been found on Hudson's Bay, and that elephants' tusks were reported to occur on an island in its northern part. Isolated discoveries of elephantine remains had been made in the North-west territories, and several on the Rat River, a tributary of the Yukon, near the borders of Alaska.

In referring to the economic minerals, Professor Bell said that even the coarser ones, such as granite, limestone, cement-stone, slate, flagstone, gypsum, clays, marls, ochres, sand for glass-making, etc., would yet have their value in different parts of the great region

[1] Abstract of a paper on the geology and economic minerals of Hudson's Bay and northern Canada, read to the Royal society of Canada, May 23, by Dr. ROBERT BELL.